Climate Change and Human Health Literature Portal

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Centers for Oceans and Human Health: A unified approach to the challenge of harmful algal blooms

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Abstract:

Background. Harmful algal blooms (HABs) are one focus of the national research initiatives on Oceans and Human Health (OHH) at NIEHS, NOAA and NSF. All of the OHH Centers, from the east coast to Hawaii, include one or more research projects devoted to studying HAB problems and their relationship to human health. The research shares common goals for understanding, monitoring and predicting HAB events to protect and improve human health: understanding the basic biology of the organisms; identifying how chemistry, hydrography and genetic diversity influence blooms; developing analytical methods and sensors for cells and toxins; understanding health effects of toxin exposure; and developing conceptual, empirical and numerical models of bloom dynamics. Results. In the past several years, there has been significant progress toward all of the common goals. Several studies have elucidated the effects of environmental conditions and genetic heterogeneity on bloom dynamics. New methods have been developed or implemented for the detection of HAB cells and toxins, including genetic assays for Pseudo-nitzschia and Microcystis, and a biosensor for domoic acid. There have been advances in predictive models of blooms, most notably for the toxic dinoflagellates Alexandrium and Karenia. Other work is focused on the future, studying the ways in which climate change may affect HAB incidence, and assessing the threat from emerging HABs and toxins, such as the cyanobacterial neurotoxin β-N-methylamino-L-alanine. Conclusion. Along the way, many challenges have been encountered that are common to the OHH Centers and also echo those of the wider HAB community. Long-term field data and basic biological information are needed to develop accurate models. Sensor development is hindered by the lack of simple and rapid assays for algal cells and especially toxins. It is also critical to adequately understand the human health effects of HAB toxins. Currently, we understand best the effects of acute toxicity, but almost nothing is known about the effects of chronic, subacute toxin exposure. The OHH initiatives have brought scientists together to work collectively on HAB issues, within and across regions. The successes that have been achieved highlight the value of collaboration and cooperation across disciplines, if we are to continue to advance our understanding of HABs and their relationship to human health. © 2008 Erdner et al; licensee BioMed Central Ltd.

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Resource Description

Communication: ⊠

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

 A focus of content

Communication Audience: ☒

audience to whom the resource is directed

 Researcher

Early Warning System: ☒

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

 A focus of content

Exposure : ☒

weather or climate related pathway by which climate change affects health

 Ecosystem Changes, Food/Water Quality, Food/Water Quality, Precipitation

   Food/Water Quality: Biotoxin/Algal Bloom, Biotoxin/Algal Bloom, Other Water Quality Issue

      Water Quality (other): Nutrients; Salinity; Water temperature

Geographic Feature: ☒

resource focuses on specific type of geography

 Freshwater, Ocean/Coastal

Geographic Location: ☒

resource focuses on specific location

 United States

Health Impact: ☒

specification of health effect or disease related to climate change exposure

 Cancer, Infectious Disease, Morbidity/Mortality, Neurological Effect, Respiratory Effect, Other Health Impact

   Infectious Disease: Foodborne/Waterborne Disease

      Foodborne/Waterborne Disease (other): Gastrointestinal illness

   Other Health Impact: Liver damage

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

 Methodology

Population of Concern: A focus of content

☐

Population of Concern: ⊠

populations at particular risk or vulnerability to climate change impacts

Children, Elderly

Resource Type: ⊠

format or standard characteristic of resource

Research Article, Review

Timescale: ⊠

time period studied

Time Scale Unspecified